WE CLAIM:

1. An optical system for detecting optical characteristics of biological tissue, said optical system comprising:

(a) a photonic energy source for emitting electromagnetic radiation, wherein said photonic energy source is controlled by a digital signal processing means;

(b) an optical emission processing means for receiving electromagnetic radiation from the photonic energy source and transmitting one or more illumination wavelengths to the biological tissue, wherein the optical emission processing means is controlled by the digital processing means;

(c) an optics assembly providing a means for aligning emitter optics of the optical emission processing means with detector optics of a received light optical processing means;

(d) a received light optical processing means for collecting and isolating one or more wavelengths of received electromagnetic radiation from the biological tissue and transmitting the isolated one or more wavelengths of received electromagnetic radiation to an optical detector, wherein said received light optical processing means is controlled by the digital signal processing means;

(e) an optical detector for sensing and converting the isolated one or more wavelengths of received electromagnetic radiation into an electrical signal; and

(f) digital signal processing means to perform match filtering of the electrical signal received from the optical detector and for controlling the functionality of the photonic energy source, the optical emission processing means and the received light optical processing means.

2. The system for detecting optical characteristics of biological tissue according to claim 1, wherein the optical emission processing means encodes the illumination wavelengths transmitted to the biological tissue.

3. The system for detecting optical characteristics of biological tissue according to claim 2, wherein the encoding is performed using a modulation technique selected from the group comprising pulse amplitude modulation, pulse frequency modulation, pulse width modulation, binary phase shift keying or a function generator.

4. The system for detecting optical characteristics of biological tissue according to claim 1, wherein the digital signal processing means is a circuit board which is integrated into a computing system.

5. The system for detecting optical characteristics of biological tissue according to claim 1, wherein the photonic energy source is selected from the group comprising a laser, a laser diode, a light emitting diode, an arc flashlamp or a continuous wave bulb.

6. The system for detecting optical characteristics of biological tissue according to claim 1, wherein optical emission processing means and the received light optical processing means include one or more optical devices selected from the group comprising condensers, focusing devices, lenses, fibre optics, apertures and monochromators.

7. The system for detecting optical characteristics of biological tissue according to claim 1, wherein the optical detector is selected from the group comprising a gallium-arsenide photodiode, a cadmium sulfide photodiode or a silicon avalanche diode.

8. Use of an optical system for generating a pattern of optical characteristics of biological tissue, said optical characteristics being reflectance and fluorescence characteristics of the illuminated biological tissue, said optical system comprising:

(a) a photonic energy source for emitting electromagnetic radiation, wherein said photonic energy source is controlled by a digital signal processing means;

(b) an optical emission processing means for receiving electromagnetic radiation from the photonic energy source and transmitting one or more illumination wavelengths to the biological tissue, wherein the optical emission processing means is controlled by the digital processing means;

(c) an optics assembly providing a means for aligning emitter optics of the optical emission processing means with detector optics of a received light optical processing means;

(d) a received light optical processing means for collecting and isolating one or more wavelengths of received electromagnetic radiation from the biological tissue and transmitting the isolated one or more wavelengths of received electromagnetic radiation to an optical detector, wherein said received light optical processing means is controlled by the digital signal processing means;

(e) an optical detector for sensing and converting the isolated one or more wavelengths of received electromagnetic radiation into an electrical signal; and

(f) digital signal processing means to perform match filtering of the electrical signal received from the optical detector and for controlling the functionality of the photonic energy source, the optical emission processing means and the received light optical processing means.

9. A method for generating a pattern of optical characteristics of biological tissue, said method comprising the steps of:

(a) illuminating the biological tissue with one or more encoded and predetermined wavelengths of electromagnetic radiation, in order to generate encoded reflectance and fluorescence from the biological tissue;

(b) collecting said generated encoded reflectance and fluorescence associated with the one or more encoded predetermined wavelengths of electromagnetic radiation;

(c) decoding said generated encoded reflectance and fluorescence associated with the predetermined one or more wavelengths;

(d) repeating steps a) through c) for a next predetermined one or more wavelengths of electromagnetic radiation;

(e) generating a pattern of optical characteristics, said pattern being a representation of the reflectance and fluorescence intensities associated with each of the predetermined wavelengths of electromagnetic radiation.

10. The method for generating a pattern of optical characteristics of biological tissue according to claim 9, wherein the pattern is a contour map, and a position on the contour map is represented by an illumination wavelength and a detection wavelength and intensity of the collected reflectance and fluorescence is represented by contours.

11. The method for generating a pattern of optical characteristics of biological tissue according to claim 9, wherein the pattern is a comparative pattern between two biological tissue samples, said comparative pattern identifying the differences between the two biological tissue samples.

12. The method for generating a pattern of optical characteristics of biological tissue according to claim 9, wherein the pattern is a three dimensional representation of the collected reflectance and fluorescence.

13. The method for generating a pattern of optical characteristics of biological tissue according to claim 9, wherein the optical characteristics of biomarkers within the biological tissue are determined.